

**AIR FORCE ENERGY PROGRAM
PROCEDURAL MEMORANDUM (AFEPPM) 96-4
1 June, 1996**

AIR FORCE ENERGY OFFICE

INVESTMENT OPPORTUNITIES FOR ENERGY AND WATER CONSERVATION PROJECTS

This memorandum describes the Air Force philosophy, organizational relationships, responsibilities, and procedures for implementing and managing the Energy Conservation Investment Program (ECIP) and Facility Energy Management Program (FEMP). AFEPPM 86-6, Facility Energy Conversion, AFEPPM 86-7, Facility Energy Metering, AFEPPM 86-16, Building Energy Technical Surveys, AFEPPM 88-6, Programming Facility Energy Efficiency Requirements; AFEPPM 88-7, Energy Conservation Investment Programs Projects; AFEPPM 88-8, Building Temperature Standards and AFEPPM 88-9, Facility Energy Life Cycle Cost Analysis are rescinded.

1. Applicability. This implementation plan applies to all Air Force organizations participating in various investment funding strategies to increase the overall energy efficiency within Air Force facilities through energy/water conservation projects. These funding strategies include: Energy Conservation Investment Program (ECIP); Facility Energy Management Program (FEMP); Productivity Investment Fund (PIF); and Fast Payback Capital Investment (FASTCAP). See attachment 1.

2. Background.

2.1. Guiding Directives. The following documents provide guidance and objectives:

2.1.1. Public Law 95-619, National Energy Conservation Act, establishes goals and criteria for construction of federal facilities to be more energy efficient.

2.1.2. Public Law 102-486, Energy Policy Act of 1992, requires all federal agencies to reduce facility energy use by 20 percent/gross square foot, below the 1985 baseline by the year 2000.

2.1.3. DMRD 907, re-establishes funding for ECIP and includes criteria for validating energy savings and reporting these results to Congress. An annual ECIP report, RCS DD-M(A)-1529, must be submitted to Deputy Assistant Secretary of Defense (Production and Logistics) to

satisfy Congressional program audits.

2.1.4. DMRD 770, establishes the FEMP with OSD providing policy and guidance for implementing this program.

2.1.5. Executive Order 12902, increases the energy reduction goal from 20 percent in 2000, to 30 percent by 2005, and requires implementation of all energy/water conservation projects with a payback of less than ten years.

2.1.6. DEPPM 91-2, establishes procedures for meeting the DoD energy management goals, including required progress reports to OSD on a quarterly basis. DoDD 5146.47, Defense Energy Information System, RCS: DD(P&L-AR 1313).

3. Responsibilities.

3.1. **HQ USAF/CEO.** Establishes facility energy program policies and submits program reports to the Office of the Deputy Assistant Secretary of Defense for Installations, Director for Energy and Engineering (ODASD(I)). HQ USAF/CEOP will develop and publish policies relative to the timely implementation of ODASD(I) (ES/CI) directives.

3.1.1. Coordinates all FEMP report data inputs and submits the consolidated report, as requested, to the ODASD(I).

3.1.2. Tracks prioritization survey and energy/water facility audit progress as required by EO 12902.

3.2. **HQ USAF/CEC.** Will issue an annual ECIP/FEMP call letter, issues design authorization for recommended ECIP projects, provides necessary design funds, and controls programming changes for ECIP/MILCON projects.

3.2.1. Issues Design Instructions (DI's) for recommended projects, authorizes advertisements and awards, issues and tracks project funds, and controls project amendments for ECIP/MILCON projects and FEMP over \$300K in the PDC system.

3.2.2. Consolidates and submits DD Form 1391 documentation for OSD and Congressional inquires.

3.2.3. Consolidates and coordinates the annual ECIP report data inputs from the PDC system, with HQ USAF/CEOP; HQ USAF/CEH; and submits the consolidated report, as requested, to the ODASD(I).

3.3. **HQ USAF/CEH.** Will coordinate with HQ USAF/CEC on all annual program call letters for MFH projects. Currently, the Housing Division has several on-going initiatives that include a Design Guide for revitalization, and retrofit that includes all applicable requirements to ensure renovated housing units meet mandatory energy standards.

3.4. **HQ AFCESA/CES.** Will keep this AFEPPM current and provides assistance in the review, validation, and execution of ECIP/FEMP projects as requested.

3.4.1. Validates all projects for applicable energy/water savings. Reviews EA's and 1391's. Develops a spreadsheet to consolidate data inputs from MAJCOMs.

3.4.2. Provides spreadsheet to rank projects according to SIR. Submits spreadsheet to HQ USAF/CEO/CEC for final ranking and approval.

3.4.3. Develops status/tracking reports for ECIP/FEMP awarded projects. Submits as requested to HQ USAF CEO/CEC.

3.5. **Major Commands (MAJCOMs).**

3.5.1. Develop and implement a plan to do facility energy/water audits on 10 percent of their facilities each year. Installations that have previous surveys (three years older or less) can use these to meet this requirement.

3.5.2. Develop an investment strategy for facility energy projects to meet the command's energy goals, and decide to what extent and through which funding avenue the best potential for success of these projects will be achieved.

3.5.3. Coordinate through the MAJCOM Energy Steering Group the need and validity of all facility energy projects. Reference AFPD 23-3, Energy Management, 7 Sep 93.

3.5.4. Issue call to bases to submit facility energy projects in anticipation of the annual Air Force call for submittals. Once received from their bases, major commands must review, validate, and consolidate the submittal list. Forward list/documentation to HQ USAF/CEO/CEC and HQ AFCESA/CES.

3.5.5. Ensure that ECIP projects over \$300K, and all projects to be funded with MFH are entered into the PDC system. Update PDC when a change occurs in the project. For FEMP, ensure projects are in the Project by Contract , Construction Management System (PCMS) and update every quarter.

3.5.6. Notify HQ USAF/CEC immediately when an approved ECIP project must be canceled.

Complete and keep on file the detailed reports on projects that were canceled, deferred, reduced in cost, or whose savings failed to meet the estimated savings.

3.5.7. Is responsible for ECIP/FEMP project scope accomplishment. Energy and dollar savings validation must be performed on each project after completion, and the cumulative results reported in the established annual energy report.

3.5.8. Immediately notify HQ USAF/CEO/CEC if the statistics or scope of work on any validated, under design, energy project changes by 10 percent or more. This includes SIR, dollars, MBTU savings, dollar savings etc.

3.5.9. Track and validate these projects using a spreadsheet developed by HQ AFCESA. Update this spreadsheet at least quarterly or as directed by Air Staff.

3.6. Installations.

3.6.1. Installations, in conjunction with their major command, must decide to what extent and through which funding avenues energy/water conservation projects will be supported and managed.

3.6.2. The Base Energy Steering Group must coordinate the need and validity of individual facility energy projects. Reference AFPD 23-3, Energy Management, 7 Sep 93.

3.6.3. Base engineers, as a result of their building energy/water technical survey programs, should develop energy conservation projects well in advance of the annual program call.

3.6.4. Prepare DD Form 1391 with the normal MILCON line-item detail. DD Form 1391 for ECIP projects will contain the notation "ECIP" at the beginning of the title block and will include line item identification, description, location, CWE, total project SIR, annual dollar savings (including all associated costs, i.e., energy/water costs, maintenance and repair costs, sewer costs, etc.), and energy savings in MBTUs.

3.6.5. Title the projects under one of the fourteen categories listed in attachment 2. A project is classified in a category if 75 percent of the scope of the project falls into that category. Projects that do not contain 75 percent in any one category shall be identified as "Facilities Energy Improvement."

3.6.6. For each project, submit copies of the life-cycle analysis for each discrete portion, and for the overall project. Use the format, at attachment 4, for reporting the life-cycle cost analysis on a DD Form 1391c.

3.6.7. Submit supporting documentation consisting of basic assumptions, basic engineering, and economic calculations showing how savings were determined. Computer-generated summaries are acceptable provided they conform to the above.

3.6.8. Use metric units in support of Executive Order 12770, "Metric Usage in Federal Government Programs", dated July 25 1991.

3.6.9. Clearly define the conservation measure that provides the energy/water savings and the specific facilities affected by the project.

3.6.10. Provide an execution plan. Identify the design and construction agent (base, MAJCOM, Corps or Navy), and how long it will take to get the project designed and awarded.

3.6.11. Include a statement regarding whether or not the installation affected by the project is being considered for closure or realignment. If so, provide an explanation on why the project should be considered in the face of the closure or realignment.

3.6.12. Include a detailed statement on how you plan to verify savings after the project is executed.

3.6.13. Maintain electronic input via PDC, consisting of the program initial input screen with Program Type = ECP and PDP = ECIP, plus DD Forms 1391 and the applicable energy screens. Update PDC every quarter or when a change occurs in the project.

3.6.14. Maintain electronic input via PCMS, for all FEMP projects under \$300K. Ensure the proper energy conservation code is selected for these entries. Update every quarter or when a change occurs.

4. Management Principles and Concepts.

4.1. Program Credibility. To maintain credibility in the facility energy program and provide report as required. It is essential that documentation be diligently maintained by installations, MAJCOMs, and design/construction agents. This documentation should include scope and scope changes, design projections, auditable trails of cost, cost avoidance, energy savings, savings to investment ratios, simple amortization, etc. Each level of command should assist in maintaining the audit trails in order to provide quick, positive responses to DoD and the Congress.

4.2. Energy Savings Validation. Congress has repeatedly expressed its desire for reasonable validation of the benefits from the ECIP/FEMP. Clearly, the continued level of support for these programs is dependent on the presentation of a convincing demonstration that funds

spent on these projects are managed prudently. In addition, a rigorous after-the-fact analysis is essential for future project programming to identify projects which are more cost effective in practice as well as theory, and to identify any real world savings limiting constraints which may not be apparent to the design engineer.

4.2.1. A method of validation which is most often used, and is recommended, is "before and after" metering. However, there are other methods that may be used depending on project types and complexity.

4.2.1.1. Meters can be installed using P313 MCP Planning and Design funds prior to construction. Use P321 MCP CONUS, and P331 MCP Overseas funds after award of construction contract.

4.2.1.2. For MFH projects, use P722 MFH Maintenance and Repair Funds prior to construction, and P713 MFH Post Acquisition funds after award of the construction contract.

4.2.1.3. Water savings can be based on industry and/or regional standard water use data or figures based on calculations and reasonable assumptions.

4.3. **Energy Timetables for FEMP/ECIP.** These timetables (Atch 3) are to be used for planning purposes (experience has demonstrated the infeasibility of a static schedule thus flexibility is key to the success of these programs) and scheduling of project submission to HQ USAF CEO/CEC and HQ AFCESA/CES.

OPR: HQ USAF/LGSP (Major Davis)

Attachment 1

Investment Strategies

A1.1. Energy Conservation Investment Program (ECIP)

A1.1.1. ECIP Defined. Any project that will reduce energy consumption, costs, provide savings in operating and maintenance costs, and help achieve the energy goals, can be considered an ECIP candidate. This is a Military Construction (MILCON) funded program primarily intended for accomplishing energy conservation retrofits of existing buildings. It includes construction of new, high-efficiency energy systems and modernization of existing systems.

A1.1.2. Programming Criteria.

A1.1.2.1. Objectives. The basic objectives of ECIP are energy conservation and energy cost savings. For a project to be eligible for the program, at least 20 percent of its annual dollar savings must be attributed to energy (BTU) savings. Water projects are exempt from the 20 percent savings requirement.

A1.1.2.2. Project Evaluation. Projects are ranked on the basis of the greatest potential life-cycle cost payback as indicated by the SIR and payback period. Additional consideration is given to projects that substitute renewable energy for nonrenewable energy.

A1.1.2.3. Payback Standard. Projects must have an SIR greater than 1.25 and a discounted payback period of ten years or less.

A1.1.2.4. Commander Certification. Energy Management and Control System (EMCS) projects **must** have the installation commander's certification that appropriate resources will be committed to effectively operate the system over the life-cycle of the investment.

A1.1.2.5. Project Life-Cycle Cost Analysis. Required for each-overall and for each discrete retrofit action (i.e., storm windows, insulation, economizer, etc.) included within the project will be performed and be included with the 1391 project documents submitted for consideration.

A1.1.2.5.1. Base all analyses on an economic life as shown in attachment 2 or the anticipated life of the retrofit action or facility, whichever is less.

A1.1.2.5.2. Use the actual current cost of energy at the facility.

A1.1.2.6. Discounted Dollar Savings. For the purpose of ranking qualified projects, all discounted dollar savings (100 percent) will be used for computing the SIR.

A1.1.2.7. Calculation Standards. The estimated construction cost, labor and material costs, and the actual current unit costs of the energy at the facility analyzed (cost to the Government, not stock fund prices) will be used as the basis for all life-cycle cost calculations.

A1.2. Facility Energy Management Program (FEMP)

A1.2.1. FEMP Defined. Any operation and maintenance funded repair project or any minor construction project less than \$300K that will reduce energy consumption, costs, provide savings in operating and maintenance costs, and help achieve the energy goals, can be considered a FEMP candidate. This funded program is for accomplishing energy conservation retrofits of existing buildings or new construction. It includes construction of new, high-efficiency energy systems and modernization of existing systems. FEMP projects will use the same program criteria as in the ECIP program.

A1.2.2. FEMP Projects Under \$300K. Projects must have an estimated cost of at least \$15K and must meet the same criteria as stated in the ECIP program. However, the submittals for these projects will be submitted as line items and ranked in order of the highest to lowest SIR. These line items will include a cost estimate, simple payback, estimated date of award, estimated savings, and consumption reduction. Include a few sentences with the submittal to describe the current condition and how the proposed project will achieve savings.

A1.3. Fast Payback Capital Investment (FASCAP) Program--FASCAP Projects:

A1.3.1. FASCAP Defined. Although the DoD identifies this program as the "Productivity Enhancing Incentive Fund" (PEIF), the Air Force uses the acronym "FASCAP" in addressing this program. This program became self-sustaining in FY92. All FASCAP projects have to cost less than \$150K and need to amortize within two years from the date they become operational. Projects are determined based on their Savings-to-Investment Ratio (SIR), and the supporting economic justifications must be validated by the base Manpower and Organization staff before proposals can be submitted to MAJCOMs. For additional information, consult AFI 38-301, *Productivity Enhancing Capital Investment Program*, 10 Jun 1994.

A1.3.2. Hard Savings. Benefits that you can precisely measure, quantify, and place under management control at the time the benefits occur. You can reflect hard savings as specific reductions in the approved program or budget after you have obtained them. Examples include:

A1.3.2.1. Costs for manpower authorizations or funded work year reductions.

A1.3.2.2. Reduced or removed operating costs (such as utilities, travel, and repair).

A1.3.2.3. Reduced or removed parts and contracts.

A1.3. Productivity Investment Fund (PIF)

A1.3.1. PIF Defined. PIF proposals have the same requirements as FASCAP, except the cost must be over \$150K, amortized within four years from the date they become operational. MAJCOMs, FOAs, and DRUs report projected needs to the HQ USAF Productivity Office every two years. Identify funds by program, appropriation, and amount.

A1.3.2. Additional References. For additional information, consult AFI 38-301, *Productivity Enhancing Capital Investment Program*, 10 Jun 1994.

Attachment 2

Energy and Water Conservation Project Types

(Recommended Economic Analysis Life)

Cat.	Title	Description
1	EMCS or HVAC (10 years)	Controls Projects which centrally control energy systems with the ability to automatically adjust temperature, shed electrical loads, control motor speeds, or adjust lighting intensities.
2	Steam and Condensate Systems (15 years)	Projects to install condensate lines, cross connect lines, distribution system loops, repair or install insulation, and repair or install steam flow meters and controls.
3	Boiler Plant Modifications (20 years)	Projects to upgrade or replace central boilers or ancillary equipment to improve overall plant efficiency. This includes fuel switching or dual fuel conversions.
4	Heating, Ventilation, Air Conditioning (HVAC) (20 years)	Projects to install more energy efficient heating, cooling, ventilation, or hot water heating equipment. This includes the HVAC distribution system (ducts, pipes, etc.).
5	Weatherization (25 years)	Projects improving the thermal envelope of a building. This includes building insulation (wall, roof, foundation), insulated doors, windows, vestibules, earth berming, shading, etc.).
6	Lighting Systems (15 years)	Projects to install replacement lighting systems and controls. This would include daylighting, new fixtures, lamps, ballasts, photocells, motion sensors, IR sensors, light wells, highly reflective painting, etc.
7	Energy Recovery Systems (20 years)	Projects to install heat exchangers, regenerators, heat reclaim units or recapture energy lost to the environment.

8	Electrical Energy Systems (20 years)	Projects that will increase the energy efficiency of an electrical device or system, or reduce cost by reducing peak demand.
9	Solar Systems (10 years action) (20 years passive or PV)	Any project utilizing solar energy. This includes solar heating, cooling, hot water, industrial process heat, photovoltaics, wind energy, biomass energy, geothermal energy, and passive solar applications.
10	Facility Energy Improvements (20 years)	Multiple category projects or those that do not fall into any other category.
11	Water Conservation Retrofit (5 years)	Projects to install low flow fixtures, control devices, or more water efficient equipment.
12	Leak Detection/Repair (25 years)	Projects to repair water leaks in water main and plumbing systems.
13	Water Efficient Landscape (15 years)	Projects to install xeriscape, subsurface/drip irrigation, irrigation management systems, etc.
14	Water Reuse (25 years)	Projects for gray water reuse and wastewater treatment for reuse.

Attachment 3

Program Timetables

ECIP Timetable

ACTION	OPR	DATE
Call Letter	HQ USAF/CEC	Jan
Project Validation	HQ AFCESA/CES	Apr-May
1391 Review	HQ USAF/CEC	Apr-May
To OSD/SAF	HQ USAF/CEC	1 Jun
AF Receives \$\$	HQ USAF/CEC	Oct
Money sent to MAJCOMs	HQ USAF/CEC	Oct
Issue DI	HQ USAF/CEC	on going
Issue Authority to Advertise	HQ USAF/CEC	on going
Savings revalidated before award	HQ AFCESA/CES	on going
Issue Authority to Award	HQ USAF/CEC	on going
Status reports & tracking (after award)	HQ AFCESA/CES	monthly

FEMP Timetable

ACTION	OPR	DATE
Call Letter	HQ USAF/CEO	Jan
Project list from MAJCOM's w/EA's	HQ USAF/CEO HQ AFCESA/CES	Apr
Project validation	HQ AFCESA/CES	Apr-May
Start designs before list goes to OSD	MAJCOM/bases	on-going
50% of the projects ready to advertise	MAJCOM/bases	1st Qtr
20% of the projects awarded	MAJCOM/bases	1st Qtr

100% of the projects awarded	MAJCOM/bases	by 4th Qtr
Issue \$\$ to MAJCOM	HQ USAF/CEO	1st Qtr
Savings revalidated before award	HQ AFCESA/CES	on going
Status reports & tracking (after award)	HQ AFCESA/CES	on going

Attachment 4

SAMPLE FORMAT LIFE-CYCLE COST ANALYSIS FOR ENERGY CONSERVATION INVESTMENT PROGRAM PROJECTS

DATE: 09 AUG 1994 FY 96 PROGRAM
PROJECT NUMBER: CESE904283
PROJECT TITLE: ECIP: Insulate Steam Lines
INSTALLATION: Any Air Force Base
LOCATION: USA

SECTION 11 - ECONOMIC ANALYSIS

11C CONSIDERATION OF ALTERNATIVES

Maintain Status Quo

Insulate Steam Distribution System

11D ECONOMIC JUSTIFICATION SUMMARY

Life-Cycle Cost Analysis Data Base

1. Investment costs were calculated using R. S. Means estimating publications. Total investment costs, including contingency and SIOH = \$443K.

2. Energy savings were calculated using various energy conservation publications.

- a. Documents included:
 - (1) Architects & Engineers Guide to Energy Conservation in Existing Buildings, DOE, 1979.

(2) ASHRAE Fundamentals, 1985.

(3) The 1975 Energy Management Guidebook, published by editors of Power Magazine, McGraw Hill Inc, NY, NY, 1975.

b. Distillate fuel oil will not be affected by the project. Initial firing of the boilers uses number two fuel oil. Firing up procedures at the beginning of the heating season will not change.

- Distillate fuel oil savings = 0

c. Residual fuel oil (No. six fuel oil) is the primary fuel used in the central heating plant steam distribution system.

- (1) Data base:

- (a) Boiler data--temperature at 100psi = 338 F, 80psi = 324 F

- (b) Assume average steam/condensate temperature in the line = 240° to 250° F.

- (c) To be conservative, assume some of the lost heat from the pipes will find its way to ground level, due to both the large amount of heat lost and the circulation built up by both the temperature gradient and the unit heater blowers. Assume 25 percent of the lost heat is returned to the floor level.

(2) Current situation--No insulation on steam or condensate lines in warehouse two. No insulation on the condensate lines in warehouse three. The steam line in warehouse three does have insulation installed.

- (a) Heat loss calculations:

- $Q(\text{bare}) = T \cdot L$

- where $Q(\text{bare})$ = bare pipe seasonal heat loss

- HL = Unit heat loss

- T = seven-month heating season = 5040 hours

- L = Unit length of pipe

(b) Heat loss

■ Pipe Size	BTUH/10'	10' Lengths(L)	Q(MBTU/season)
1/2 in	1125	226.8	1,285.956
3/4 in	1350	154.0	1,047.816
1 1/2 in	2300	226.8	2,629.066
2 1/2 in	3250	913.7	14,966.406
4 in	5160	446.4	11,609.257
6 in	7360	12.0	445.133
Total Q(bare) = HL*T*L =			31,983.634

(3) Proposed Situation: Install 2 inches of insulation on all bare steam and condensate lines in warehouses two and three.

■ (a) Heat loss calculations:

■ Pipe Size	BTUH/11	Length(LF)	Q(MBTU/season)
1/2 in	12	2268	137.169
3/4 in	13	1340	100.901
1 1/2 in	20	2268	228.614
2 1/2 in	26	9137	1,197.312
4 in	55	4464	1,237.421
6 in	75	120	45.360
Total Q(insulated) = HL*T*L =			2,946.777

(4) Residual fuel savings = q(bare) - Q(insulated)

$$\begin{aligned}
 Q(\text{lost}) &= 31,983.634 \text{ MBTU/yr} - 2,946.777 \text{ MBTU/yr} \\
 &= 29,036.857 \text{ MBTU/yr}
 \end{aligned}$$

Not all heat lost from the pipes will be lost to the facility. Even though the warehouses have high bays, we can assume 20 percent of the heat is recycled through the buildings.

$$\text{Therefore } Q(\text{lost}) = 29,037 \text{ MBTU/year} * .75 = 21,777 \text{ MBTU/yr}$$

Considering boiler efficiency of 78 percent, this equates to a residual fuel input equal to 21,777 MBTU/yr/.78 = 27,919 MBTU/yr

ENERGY CONSERVATION INVESTMENT PROJECT (ECIP) PROGRAM

LIFE-CYCLE COST ANALYSIS SUMMARY

LOCATION: Price Support Ctr REGION NO. 2 PROJECT NUMBER: CESE904283
 PROJECT TITLE ECIP: Insulate Steam Lines FISCAL YR 96
 DISCRETE PORTION NAME: Insulate Warehouse Steam Distribution Lines
 ANALYSIS DATE: Aug 94 ECONOMIC LIFE 15 YEARS PREPARED BY: J Hooten

1. INVESTMENT

A. CONSTRUCTION COST \$ 350,000
 B. SIOH \$ 93,000
 C. DESIGN COST \$ 12,048
 D. SALVAGE VALUE COST \$ 000
 E. PUBLIC UTILITY REBATES \$ 000
 F. TOTAL INVESTMENT (1A + 1B + 1C - 1D - 1E) \$ 455,048

2. ENERGY SAVINGS (+) / COST (-)

UNIT COST SAVINGS ANNUAL \$ DISCOUNT FACTOR DISCOUNTED
 FUEL \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5)

A. ELECT \$ 16.23 11 \$ 185 15.05 2,785
 B. DIST \$ \$
 C. RESID \$ 6.61 27,919 \$ 184,545 28.23 5,209,694
 D. NAT G \$ \$
 E. COAL \$ \$
 F. TOTAL 27,930 \$ 184,730 \$ 5,212,479

3. NON-ENERGY SAVINGS(+) / COST (-)

A. ANNUAL RECURRING (+/-) \$ 0
 (1) DISCOUNT FACTOR (TABLE A)
 (2) DISCOUNTED SAVING/COST (3A X 3A1) \$

B. NON RECURRING SAVINGS (+) / COST (-)

SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED SAV-
ITEM COST (-)(1) OCCUR.(2) FACTOR(3) ING(+) COST(-)(4)

a. _____ \$ _____ \$ _____
b. _____ \$ _____ \$ _____
c. _____ \$ _____ \$ _____
d. TOTAL \$ _____ \$ _____

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS(+)/COST (-)(3A2+3Bd4)
\$ _____

4. FIRST YEAR DOLLAR SAVINGS $2F3+3A+(3B1D/(YRS\ ECONOMIC\ LIFE))$
\$___184,730

5. TOTAL NET DISCOUNTED SAVINGS $(2F5+3C)$ \$_5,212,479

6. DISCOUNTED SAVINGS RATIO (SIR) $= (5/1F)$ _____ 11.45 (IF SIR<1.25 PROJECT DOES NOT QUALIFY)

7. SIMPLE PAYBACK PERIOD (ESTIMATED) (SPB) $= (1F/4)$ __2.46 YRS

LIFE-CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROJECT (ECIP) PROGRAM

LOCATION: _____ REGION NO. _____ PROJECT NUMBER: _____
PROJECT TITLE _____ FISCAL YR _____
DISCRETE PORTION NAME: _____
ANALYSIS DATE: _____ ECONOMIC LIFE _____ YEARS
PREPARED BY: _____

1. INVESTMENT

A. CONSTRUCTION COST \$ _____
B. SIOH \$ _____
C. DESIGN COST \$ _____
D. SALVAGE VALUE COST \$ _____
E. PUBLIC UTILITY REBATES \$ _____
F. TOTAL INVESTMENT $(1A + 1B + 1C - 1D - 1E)$ \$ _____

2. ENERGY SAVINGS (+) / COST (-)

UNIT COST SAVINGS ANNUAL \$ DISCOUNT FACTOR DISCOUNTED
 FUEL \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5)

A. ELECT \$ _____ \$ _____
 B. DIST \$ _____ \$ _____
 C. RESID \$ _____ \$ _____
 D. NAT G \$ _____ \$ _____
 E. COAL \$ _____ \$ _____
 F. TOTAL _____ \$ _____ \$ _____

3. NON-ENERGY SAVINGS(+) / COST (-)

A. ANNUAL RECURRING (+/-) \$ _____
 (1) DISCOUNT FACTOR (TABLE A) _____
 (2) DISCOUNTED SAVING/COST (3A X 3A1) \$ _____

B. NON RECURRING SAVINGS (+) / COST (-)

SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED SAV-
 ITEM COST (-)(1) OCCUR.(2) FACTOR(3) ING(+) COST(-)(4)

a. _____ \$ _____ \$ _____
 b. _____ \$ _____ \$ _____
 c. _____ \$ _____ \$ _____
 d. TOTAL \$ _____ \$ _____

C. TOTAL NON-ENERGY DISCOUNTED SAVINGS(+)/COST (-)(3A2+3Bd4)
 \$ _____

4. **FIRST YEAR DOLLAR SAVINGS** $2F3+3A+(3B1D/(YRS\ ECONOMICLIFE))$
 \$ _____

5. **TOTAL NET DISCOUNTED SAVINGS** $(2F5+3C)$ \$ _____

6. **DISCOUNTED SAVINGS RATIO (SIR)** $=(5/1F)$ _____ (IF SIR<1.25 PROJECT
 DOES NOT QUALIFY)

7. **SIMPLE PAYBACK PERIOD (ESTIMATED) (SPB)** $=(1F/4)$ _____ YRS

VERIFICATION PLAN SAMPLE

This example demonstrates the extent of detail needed to verify an energy savings project. Each validation plan must include an accurate assessment of the projects savings. In the plan, describe the procedures, methods and equipment you will use and how this effort will be recorded to provide operational data, and assess the efficiency of this new system. This verification will be included with all projects and submitted on a DD Form 1391c for all ECIP and FEMP projects over \$300K. FEMP projects under \$300K do not have to submit this statement on a DD Form 1391, but it will be attached with the project.

SAMPLE

SAVINGS VERIFICATION PLAN

The savings that are experienced as a result of these initiatives will be verified as follows. First, a base-line of energy consumption will be established for several typical metered facilities prior to EMCS installation. This will be done by reviewing past meter readings over the entire year of actual energy consumption per square foot for these facilities. This data will then be compared to the new energy consumption after EMCS initiatives are implemented. True dollar costs and BTU consumption rates can then be calculated to show the savings associated with the metered facilities and estimated savings can be derived through application of square foot costs/savings to similar facilities which are not metered. Once these facilities become metered, the actual readings can be used to verify savings due to EMCS connections.
